RATIONS FOR GROWING AND FATTENING ROASTERS AND CAPONS

OHIO

Agricultural Experiment Station

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BULLETIN 284

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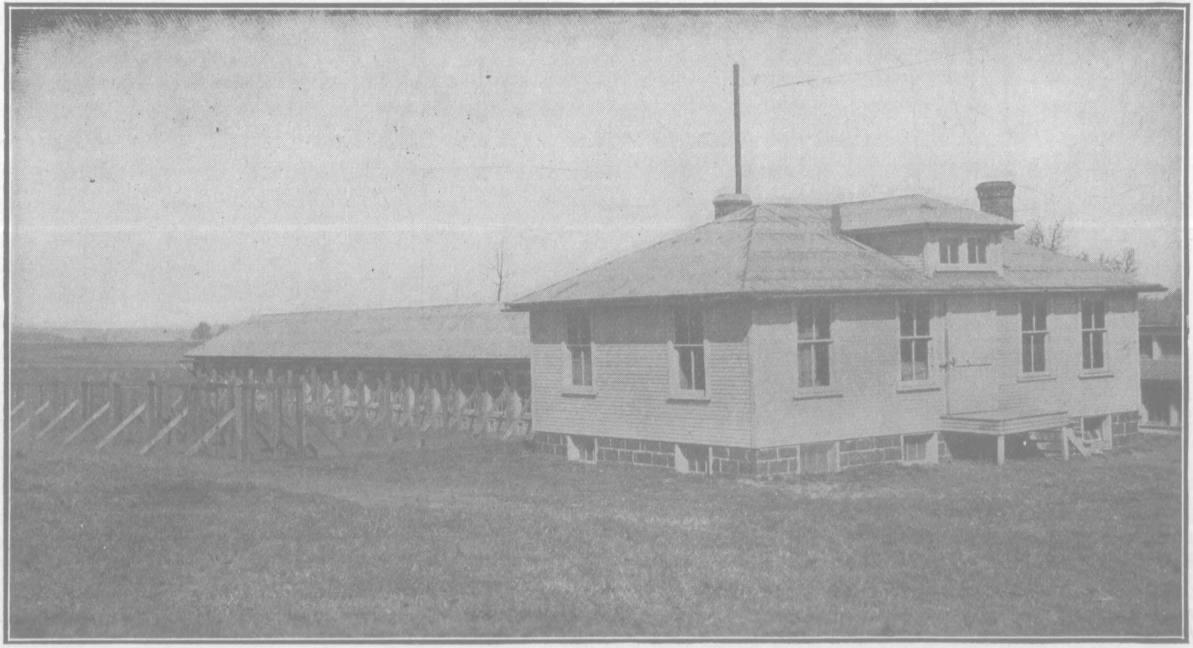

Incubator cellar, 20 ft. x 32 ft., with feed storage and work room above. Brooder house, 15 ft. x 80 ft.

BULLETIN
OF THE
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NUMBER 284 MAY, 1915

RATIONS FOR GROWING AND FATTENING ROASTERS AND CAPONS

By W. J BUSS

INTRODUCTION

Owing to the tendency toward higher prices for all kinds of meats during recent years, there is an opportunity for poultrymen (the term "poultrymen" is intended to include farmers who keep poultry) to devote some special attention to the growing of chickens to be sold for meat. While it is true that all poultrymen sell some chickens for meat, these generally consist of old hens that are thought to have passed their period of usefulness in the laying flock, or of surplus cockerels that are sold during a period of low prices and yield little, if any, profit. With cockerels of the heavier breeds, the profit secured will be considerably increased if at least part of the cockerels are caponized and sold during the winter instead of being sold in August or September. With cockerels of the lighter breeds, such as Leghorns, caponizing will probably not pay. These should be sold as broilers, weighing 1 to 2 pounds. In most cases a good laying strain of pullets will doubtless be worth more if kept for egg production than if sold at maturity for meat. If more pullets are raised than can be accommodated in the laying flock, they may be disposed of at a profit as roasters. This will also provide a satisfactory way of disposing of birds that do not come up to requirements for use in the laying flock.

EXPERIMENT I

June 18, 1913-Jan. 27, 1914—32 weeks

OBJECT

The object of this experiment was to determine the relative efficiency and economy of five different rations (as described below) for production of roasters and capons, and to determine the amount of feed required to produce a pound of gain.

Description of chickens used: Of the chickens used in this experiment, 139 were pure-bred Barred Plymouth Rocks, and 56 were cross-bred. Fifty of the cross-breds were the progeny of a Barred Rock male mated with Light Brahma females, and 6 were the progeny of a White Leghorn male and Light Brama females. There were 94 cockerels and 101 pullets. The chicks were hatched March 25 to April 14. All except eight of the cockerels were caponized July 31.

Treatment before experiment began: The chicks were all treated alike before the experiment began. They were hatched in incubators and brooded artificially. They were left in the incubators until the youngest were 24 to 36 hours old. They were then carefully removed to the brooders to prevent chilling. During the first day in the brooders, they received nothing but water and "chick size" commercial grit. Until they were three weeks old, they were fed twice daily a grain mixture composed of 4 parts, by weight, of cracked corn, 2 parts cracked wheat, and 1 part steel cut oats. The mash mixture, fed three times daily, was made up of 3 parts rolled oats, 2 parts ground corn, and 2 parts sifted beef scraps. Just before feeding, sufficient sour skim milk was added to the mash to make it crumbly. After the chicks were three weeks old the steel cut oats were omitted from the grain mixture, and the mash mixture was made up of 3 parts ground corn, 1 part bran, and 2 parts beef scrap. This mash mixture was fed dry. Equal amounts by weight of grain and mash were fed in both cases. In changing from one ration to the other, the change was made very gradually, taking four or five days to complete it. The number of feeds was gradually reduced until at about 10 weeks of age the chicks were being fed mash once daily—at noon—and grain twice daily—early morning and late afternoon. As soon as the chicks were large enough (one to two weeks old) readily to eat whole wheat, it was no longer cracked for them. The chicks were allowed access to lots outside the brooder house whenever the weather was suitable.

Quarters: Each lot of 39 birds was housed in half of a shed roof house 10x12 feet in size and had access to a well sodded plot, containing one-sixth acre, in a plum orchard, which furnished an abundance of shade and grass. When there was snow on the ground the birds were confined to the houses. The hay on these plots had been harvested just prior to the time the chicks were placed in them.

Rations: The following rations were used (proportions are by weight):

Lot 1. Grain—Corn
Mash—Ground corn, 2; beef scrap, 1.
Lot 2. Grain—Corn.
Mash—1st week, ground corn, 1; beef scrap, 2. Amount of ground corn was increased 1 part each week so that mash for the 32nd week was composed of 32 parts ground corn and 2 parts beef scrap.
Lot 3. Grain—Corn, 11; wheat, 15; oats, 4.
Mash—Ground corn, 2; bran, 2; beef scrap, 1.
Lot 4. Grain—Corn.
Mash—Ground corn, 7; tankage, 3.
Lot 5. Grain—Corn.
Mash—Ground corn, 3; oilmeal, 4. This ration was fed for 12 weeks; the chickens did so poorly up to this time, as shown in Tables III and VIII, that they were fed the same ration as Lot 1, after the 12th week.

In addition to these rations, each lot had access to grit, charcoal, and an abundant supply of water.

The wheat and corn were of good quality. The ground corn in the mash was rather coarsely ground. Beef scrap and tankage were guaranteed to contain 50 percent and 60 percent of protein, respectively. The linseed oilmeal was finely ground.

Method of feeding: The grain was fed twice daily. During the hot weather in summer and early fall, when the ground was dry, the grain was scattered on the ground. At other times it was scattered in the litter in the house. The mash was kept in self-feeding hoppers to which the birds had access at all times. It was planned to have the birds eat half as much, by weight, of mash as of grain. All lots, however, consumed slightly more than this proportion of mash. (See Table VI, p. 162.)

Mortality: In all, 11 birds died during the experiment. Two of these were killed while being caponized. The other 9 were distributed as follows: Three in Lot 1; 1 in Lot 2; 2 in Lot 4; and 3 in Lot 5.

Removal of pullets and cockerels: In order to prevent egg production from interfering with gains made by pullets in this experiment, all pullets were removed from the experimental lots soon after

TABLE I. Pullets and cockerels removed from lots.

Date of removal	Weeks in experiment	Lot 1		Lot 2		Lot 3		Lot 4		Lot 5	
		Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight
			Lbs.		Lbs.		Lbs.		Lbs.		Lbs.
Oct. 8.....	16	2	9.7	2	9.45	4	18.55	3	15.35	.	....
Nov. 5.....	20	7	35.2	.	....	2	9.7	4	18.6	2	9.1
Dec. 3.....	24	5	27.2	4	26.3	6	32.05	3	17.9	1	5.85
Dec. 3.....	24	2*	15.05	1*	7.5	4*	31.85	1*	8.5	.	....
Total.....		16	87.15	7	43.25	16	92.15	11	60.35	3	14.95

*Cockerels.

they began to lay. The 8 cockerels which were not caponized were also removed from the lots on December 3. Table I shows the dates of removal and number and weight of pullets and cockerels that were removed.

TABLE II. Individual weights and gains.

No.	Sex	Initial weight Lbs.	Final weight Lbs.	Av. weekly gain Lbs.	Weeks in experiment	No.	Sex	Initial weight Lbs.	Final weight Lbs.	Av. weekly gain Lbs.	Weeks in experiment
		Lot 1						Lot 2			
1	F	1.05	5.2	.207	20	40	F	1.75	4.75	.187	16
2	M	2.	6.6	.144	32	41	M	1.85	7.	.161	32
3	F	1.5	4.7	.160	20	42	M	2.5	9.75	.227	32
4	M*	2.15	7.85	.238	24	43	M	1.05	5.5	.139	32
5	F	1.5	6.3	.240	20	44	F	1.25	5 2	.165	24
6	M	1.45	2.25	.085	9 4	45	F	1.5	6 45	.206	24
7	M	2.1	10.35	.268	32	46	M	1.5	8 4	.216	32
8	M*	1.6	7.2	.233	24	47	F	.8	3.4	.081	32
9	F	1.6	7.6	.188	32	48	F	.95	6.1	.161	32
10	F	.9	3.85	.148	20	49	M	1.1	9.2	.253	32
11	F	1.95	5.4	.216	16	50	F	1.05	6.25	.163	32
12	M	1.4	7.45	.189	32	51	F	1.2	6.4	.163	32
13	F	1.	5.	.200	20	52	F	1.2	5.3	.128	32
14	F	.8	6.	.162	32	53	F	1.45	5.75	.179	24
15	F	.75	4.8	.169	24	54	F	1.	6.35	.167	32
16	F	1.5	6.75	.164	32	55	M	1.6	9.25	.239	32
17	M	1.55	10.2	.270	32	56	F	1.55	8.85	.228	32
18	M	1.4	5.45	.175	23.1	57	M	1.6	7.6	.188	32
19	F	1.3	5.25	.198	20	58	F	1.2	4.7	.219	16
20	M	1 2	7.7	.203	32	59	F	1.45	7.85	.200	32
21	F	1.	4.75	.156	24	60	M*	2.3	7.5	.217	24
22	F	1 15	4.3	.197	16	61	F	1.3	8.9	.317	24
23	F	1.1	4.2	.138	18.5	62	M	1.4	7.9	.203	32
24	M	1.45	8.85	.231	32	63	F	.9	6.2	.166	32
25	M	1.1	9.55	.264	32	64	M	1.	10.	.281	32
26	M	1.	7.75	.211	32	65	F	1.	5.9	.153	32
27	M	1.45	8.5	.220	32	66	M	1.	7.65	.208	32
28	M	1 4	7 25	.183	32	67	M	1.45	8.35	.216	32
29	M	1.1	7.5	.200	32	68	M	1.25	8.5	.227	32
30	F	.8	4.9	.205	20	69	F	.85	5.8	.155	32
31	M	.8	2.	.200	6	70	M	1.2	8.2	.219	32
32	M	1.	8.9	.247	32	71	M	1.1	9.7	.269	32
33	F	1.1	6.8	.238	24	72	M	1.05	9.4	.261	32
34	M	1.	8.1	.222	32	73	M	1.35	8.5	.223	32
35	M	1.65	8.75	.222	32	74	M	.8	6.7	.184	32
36	M	1.1	8.75	.239	32	75	M	1.	9.8	.275	32
37	F	.9	5.65	.148	32	76	M	.9	9.8	.278	32
38	F	1.	4.7	.154	24	77	F	.95	6.	.158	32
39	F	1.1	6.15	.210	24	78	F	1.1	2.1	....	15.4
		Lot 3									
79	M	1.5	9.6	.253	32	99	M	.9	7.6	.209	32
80	F	1.1	5.85	.198	24	100	F	1.2	6.0	.150	32
81	M	2.1	10.2	.253	32	101	F	.95	4.7	.156	24
82	M	2.1	6.	.122	32	102	F	1.1	4.75	.228	16
83	F	1.5	5.95	.278	16	103	F	.9	5.5	.192	24
84	F	1.65	7.85	.194	32	104	F	1.05	5.0	.198	20
85	M	1.5	8.45	.217	32	105	M	1.05	7.4	.198	32
86	F	1.7	4.25	.159	16	106	F	1.25	8.2	.217	32
87	M	1 3	7.9	.206	32	107	F	1 25	7.0	.180	32
88	F	1.5	3.6	.131	16	108	M*	1.5	8.3	.283	24
89	F	.8	7.2	.200	32	109	M	.8	8.9	.253	32
90	M	.8	9.1	.259	32	110	M	1.1	8.0	.216	32
91	M	.85	8.0	.223	32	111	M	1.45	8.8	.230	32
92	F	1.1	6.0	.153	32	112	M	1.2	9.5	.259	32
93	F	1.1	5.3	.175	24	113	F	.85	4.7	.193	20
94	F	.85	6.1	.164	32	114	M*	1.3	7.1	.242	24
95	F	1.4	7 3	.184	32	115	F	1.2	7.65	.202	32
96	M*	1.65	7.1	.227	24	116	F	.9	5.4	.188	24
97	F	1.5	5.3	.158	24	117	M	.85	6.5	.177	32
98	M*	2.1	9.35	.302	24						

All males except those marked (*) were caponized July 31.

TABLE II. Individual weights and gains.—Concluded.

No.	Sex	Initial weight Lbs.	Final weight Lbs.	Av. weekly gain Lbs.	Weeks in experiment	No.	Sex	Initial weight Lbs.	Final weight Lbs.	Av. weekly gain Lbs.	Weeks in experiment
		Lot 4						Lot 5			
118	M	1.3	6.3	.156	32	157	M	1.8	3.8	.063	32
119	F	1.2	6.35	.215	24	158	F	1.05	5.3	.133	32
120	F	1.85	3.75	.119	16	159	M	2.2	9.25	.220	32
121	M	1.3	6.2	.153	32	160	F	1.4	4.9	.175	20
122	M	1.8	5.7	.122	32	161	M	1.45	8.5	.220	32
123	M	1.7	11.2	.297	32	162	M	1.6	7.2	.175	32
124	M	1.45	6.5	.158	32	163	M	1.05	6.6	.173	32
125	F	2.0	6.1	.256	16	164	F	.95	.95	....	4.7
126	M	1.75	6.6	.152	32	165	M	1.	9.5	.266	32
127	F	1.1	4.25	.158	20	166	F	.95	5.15	.132	32
128	M	2.5	3.65	.192	6	167	F	.9	5.8	.153	32
129	M	.6	4.5	.144	27	168	F	.8	5.1	.134	32
130	F	.75	6.5	.180	32	169	M	2.	8.9	.216	32
131	M	1.1	6.6	.172	32	170	F	1.6	5.85	.177	24
132	F	.7	6.1	.169	32	171	M	1.9	8.3	.200	32
133	M	.9	6 7	.181	32	172	F	1.4	7.5	.191	32
134	F	.95	4.65	.185	20	173	F	.95	5.75	.150	32
135	M	.85	7.3	.202	32	174	F	1.45	1.5	.008	6
136	M*	1.3	8.5	.300	24	175	M	1.65	7.4	.180	32
137	F	.7	5.05	.136	32	176	F	1.	1.2	.043	4.7
138	M	1.05	7.0	.186	32	177	M	1.65	9.6	.248	32
139	F	1.5	5.1	.150	24	178	F	1.2	4.2	.150	20
140	F	1.6	5.5	.244	16	179	F	1.3	6.7	.169	32
141	F	1.1	7.4	.197	32	180	F	1.2	5.4	.131	32
142	M	1.45	8.65	.225	32	181	M	1.2	8.9	.241	32
143	F	1.35	6.6	.164	32	182	F	1.	6.15	.161	32
144	F	1.35	6.45	.213	24	183	F	.9	6.	.159	32
145	F	1.05	4.6	.178	20	184	M	1.15	7.75	.206	32
146	M	1.1	9.0	.247	32	185	F	1.	5.75	.148	32
147	M	.85	9.4	.267	32	186	M	.9	9.9	.281	32
148	F	.8	6.0	.163	32	187	M	.85	6.75	.184	32
149	M	1.3	8.4	.222	32	188	M	1.4	9.3	.247	32
150	F	1.05	5.55	.141	32	189	F	1.05	5.4	.136	32
151	F	1.4	4.65	.148	22	190	F	1.1	5.8	.147	32
152	F	1.2	6.0	.150	32	191	F	.85	6.55	.178	32
153	M	1.45	8.25	.213	32	192	F	1.	6.7	.178	32
154	F	1.	5.9	.153	32	193	F	1.	6.0	.156	32
155	F	1.9	5.1	.160	20	194	M	.8	8.9	.253	32
156	M	1.4	7.7	.197	32	195	M	1.25	9.0	.242	32

All males except those marked (*) were caponized July 31.

Weights and gains: The chicks were divided into lots on June 15 on the basis of individual weights taken on June 13. Initial weights were taken June 18, when the experiment began. The chickens were weighed individually at the beginning of the experiment and each fourth week thereafter. Each intervening week they were weighed by lots. Weighing was always done on the same day of the week, early in the morning.

Space does not permit publishing the weights and gains of each bird for each four week period. In Table II are given the sex, initial weight, final weight, average gain per week and length of time in experiment for each bird. It will be noted that there was considerable variation in the rate of gain of the different birds. Table IV, in which are tabulated the average weekly gains per bird, shows this variation more graphically than does Table II.

Table III shows the average weight per bird at 4-week intervals, and the average gain per bird for each 4-week period. The average weight is based on the weight of birds in lot at time of weighing, while the average gain takes into consideration gains made by birds that were taken out of lots. This will explain any slight variation between the actual differences in average weight per bird from one period to the next, and the gain as given in the table.

TABLE III. Average weight and gain per bird for each period.

Four weeks ending	Lot 1		Lot 2		Lot 3		Lot 4		Lot 5	
	Weight per bird	Gain per bird	Weight per bird	Gain per bird	Weight per bird	Gain per bird	Weight per bird	Gain per bird	Weight per bird	Gain per bird
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Av. initial weight.	1.26	.....	1.25	...	1.25	....	1.25	....	1.23	....
July 15.....	2.03	.771	2.17	.913	2.21	.954	2.00	.746	1.48	.253
Aug. 12...	3.09	1.029	2.88	.695	3.16	.950	2.92	.929	1.70	.187
Sept. 9.....	3.91	.785	3.79	.917	4.14	.983	3.66	.746	1.70	....
Oct. 7..... .	5.10	1.189	4.90	1.040	5 20	1.062	4.67	1.005	3.60	1.903*
Nov. 4.....	5.85	.688	5.63	.718	5.99	.723	5.29	.656	4.65	1.047
Dec. 2.....	6.78	.662	6.45	.818	6.65	.594	6.11	.705	5.70	1.05
Dec. 30.....	7.66	.603	7.05	.660	7.30	.530	6.58	.474	6.59	.897
Jan. 27.....	8.01	.350	7.60	.545	7.79	.496	7.06	.480	7.11	.515
Av. total gain....	...	6.451	. ..	6.389	....	6.593	....	5.933	....	5.783
Av. weekly gain...	.. .	.202	...	.200	....	.206	....	.185	....	.181

*Feed changed (see page 157).

There was considerable variation in rate of gain of different individuals. In Table IV is shown the the range of variation of weekly gains for capons, pullets and cockerels. A study of this table will show that the capons made more rapid gains than did the pullets. For the entire time that they were in the experiment only 32 percent of the capons gained less than .2 lb. per week, while 81 percent of the pullets gained less than this amount. For the first 16 weeks, while all the pullets were in the experiment, the relation between rate of gain of capons and of pullets was nearly the same, although the rate of gain for all was higher for this period than it was for the entire experiment. During the first half of the experiment, 27 percent of the capons and 63 percent of the pullets made average weekly gains of less than .2 lb. Whether or not the capons made more economical gains is not known, as all were fed together.

TABLE IV. Variation in average weekly gain per bird.

	LOT	AVERAGE WEEKLY GAIN				
		LESS THAN .150 LB.	.151 – .200	.201 –.250	.251 – .300	MORE THAN .300 LB.
CAPONS	1	I	III	⧻ III	III	
	2	I	III	⧻ IIII	⧻ I	
	3	I	II	⧻ I	⧻	
	4	I	⧻ III	⧻	II	
	5	I	⧻	⧻ III	III	
PULLETS	1	II	⧻ ⧻	⧻ I		
	2	II	⧻ ⧻ II	III		I
	3	II	⧻ ⧻ ⧻	III	I	
	4	⧻	⧻ ⧻	III	I	
	5	⧻ IIII	⧻ ⧻			
COCKERELS	1			II		
	2			I		
	3			II	I	I
	4				I	
	5					
CAPONS		6.2 %	25.9 %	44.4 %	23.5 %	
PULLETS		21.1	60.	15.8	2.1	1.1 %
COCKERELS				62.5	25.	12.5

TABLE V. Comparison of gains of pullets, capons and cockerels.

	Number	Average number of weeks in experiment	Total gain	Average gain per bird	Average weekly gain per bird
			Lbs.	Lbs.	Lbs.
Pullets	95	26.7	437.9	4.609	.172
Capons	81	32	557.1	6.878	.215
Cockerels	8	24	49.0	6.125	.255

In Table V is given a summary of the average gain of capons, pullets and cockerels in all lots. Too much importance should not be attached to the difference in rate of gain in favor of cockerels as

shown in this table, for they were selected at time of caponizing because of their large size and thrifty appearance (they were to be used for breeders the coming spring) and so are not comparable with the average, but, rather, with the best of the capons.

It is probably true that there is not so much difference in rate of growth in favor of capons as compared with cockerels, as has often been stated by enthusiasts. Experience gained from this experiment seems to indicate that with birds of equal thrift, the advantage, so far as rate of gain is concerned, might be slightly in favor of cockerels. Too few cockerels were concerned, of course, to establish this point with any degree of certainty. However, from the standpoint of meat production, even if there is no advantage in rate of gain, the increased market value will make the production of capons much more profitable than allowing the birds to mature as cockerels.

Feed consumed: Table VI gives a summary of grain, mash and other materials consumed, and the cost of these on a basis of prices given below the table. These figures are given merely as a basis of comparison of cost of feed for the different lots, and should not be

TABLE VI. Total feed consumed and feed consumed per pound of gain.

Lot No.	Average number in lot	Total feed consumed				Feed consumed per pound of gain			Cost of feed per pound of gain*
		Grain	Mash	Grit	Charcoal	Grain	Mash	Total	
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Cents
1	31.41	962.75	520.5	11.5	6.5	4.75	2.57	7.32	9.09
2	36.23	1,171.0	613.25	16.3	8.7	5.06	2.65	7.71	8.67
3	33.75	1,224.7	656.7	7.8	4.9	5.50	2.95	8.45	11.66
4	33.72	1,004.7	530.5	14.1	8.3	5.02	2.65	7.67	9.10
5	35.48	1,011.6	532.4	13.1	6.7	4.93	2.59	7.52	9.25

*Prices per hundredweight of feeds as used in calculations:

Shelled corn	$1.00	Beef scrap	$2.75
Ground corn	1.09	Tankage	2.40
Wheat	1.50	Oilmeal	1.80
Bran	1.40	Grit	.75
Oats	1.25	Charcoal	2.25

taken as indicating the total cost of production, for no account is taken of cost of labor, interest on the investment, taxes, depreciation, etc. The prices used are are not such as exist at the time this is being written. If present prices were used, they would probably not apply two or three years from now, and prices that are in effect at Wooster would not apply in all parts of Ohio at this time. On this account, the reader is cautioned against placing too much importance upon the cost of feed as given in this table. The columns showing feed required per pound of gain are of much more importance, for to these figures the feeder can apply prices that prevail at any time in his locality.

The amount of feed consumed per bird for each lot for each four-week period is shown in Table VII.

TABLE VII. Average feed consumed per bird.

Four weeks ending	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
July 15	3.41	3.56	4.14	3.33	2.84
Aug. 12	4.33	4.08	4.64	4.22	3.11
Sept. 9	4.86	4.89	6.00	4.53	2.11
Oct. 7	6.53	6.42	7.50	5.88	5.20*
Nov. 4	7.51	7.04	8.12	6.85	7.26
Dec. 2	7.43	8.18	7.67	7.30	8.03
Dec. 30	8.29	7.98	9.70	7.81	8.05
Jan. 27	7.57	8.11	10.95	7.36	7.74
Av. per bird for experiment	47.23	49.25	55.75	45.53	43.52

*Ration changed. (See page 157.)

A study of Table VII will show that there was a continuous increase in feed consumed per bird. By referring to Table III it will be found that during the last half of the experiment there was considerable decrease in rate of gain. This indicates that cost of gains gradually increased as the feeding period progressed. This point is well illustrated in Table VIII, showing feed required per pound of gain for each four-week period. On this account, the careful feeder should have rather definite information regarding feed consumed and rate of gain of the birds. This will enable him to dispose of the birds at a time when they have made a maximum profit. Market conditions should also be studied in this connection. Even though their gain in weight is not paying for feed consumed, there may be times when it will be profitable to hold the birds for awhile, in order to dispose of them on a better market. As a general rule, however, it will probably pay best to market very soon after gains cease to be made at a profit.

TABLE VIII. Feed consumed per pound of gain.

Four weeks ending	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
July 15	4.43	3.90	4.34	4.46	11.24
Aug. 12	4.21	5.87	4.88	4.55	16.74
Sept. 9	6.20	5.33	6.10	6.07	**
Oct. 7	5.49	6.17	7.06	5.85	2.73*
Nov. 4	10.91	9.80	11.24	10.45	6.94
Dec. 2	11.23	9.99	12.91	10.35	7.64
Dec. 30	13.76	12.10	18.29	16.48	8.97
Jan. 27	21.62	14.87	22.10	15.33	15.03
For experiment	7.32	7.71	8.45	7.67	7.52

*Ration changed. (See page 157).
**No gain in weight during this period.

EXPERIMENT II

Sept. 15, 1914-Jan. 25, 1915—19 weeks

OBJECT

The object of this experiment was to secure further data on the efficiency of the rations used in Experiment I for meat production. Instead of one lot being fed a ration of corn and oilmeal, however, this lot was used to secure data on results obtained when capons are confined to small pens, as compared with capons allowed range.

Description of chickens used: All birds used in this experiment were pure-bred Barred Plymouth Rock capons. The chicks were hatched March 29 to May 18. They were caponized July 24 and 30 and September 5. The method of growing these chicks prior to time the experiment began was similar in every respect to that used with the chicks in Experiment I. (See p. 156.)

TABLE IX. Individual weights and gains.

Capon number	Initial weight Lbs.	Final weight Lbs.	Average weekly gain Lbs.	Capon number	Initial weight Lbs.	Final weight Lbs.	Average weekly gain Lbs.
Lot 1				Lot 2			
1	2.15	6.95	.253	26	2.0	8.5	.342
2	2.3	6.95	.245	27	2.1	7.7	.295
3	3.05	9.3	.329	28	1.95	5.8	.203
4	2.75	8.7	.313	29	2.7	7.65	.261
5	2.5	7.25	.250	30	3.8	8.25	.234
6	2.9	7.35	.234	31	3.45	2.75[b]	....
7	3.0	8.25	.276	32	3.15	7.3	.218
8	2.8	8.4	.295	33	2.85	8.2	.282
9	3.2	6.1	.153	34	3.15	6.7	.187
10	3.05	7.9	.255	35	3.75	10.8	.371
11	2.35	7.05	.247	36	3.2	7.	.200
12	3.75	8.4	.245	37	3.6	8.35	.250
13	2.65	6.8	.218	38	2.35	7.55	.274
14	3.25	8.0	.250	39	2.85	7.9	.266
15	2.35	6.85	.237	40	2.7	8.	.279
16	4.0	8.8	.253	41	4.15	9.6	.287
17	3.3	9.9	.347	42	2.9	8.15	.276
18	4.25	9.6	.282	43	2.5	1.8[c]	....
19	4.3	8.6	.226	44	4.05	9.7	.297
20	3.55	6.8	.171	45	4.35	8.2	.203
21	3.6	7.8	.221	46	4.0	7.7	.195
22	4.85	9.0	.218	47	2.65	6.1	.182
23	2.65	5.8	.166	48	4.2	8.8	.242
24	3.85	7.7	.203	49	3.3	6.8	.184
25	3.85	5.5[a]	.199	50	4.8	8	.205

a Died Nov. 12,—in experiment 8 weeks, 2 days.
b Died Dec. 1,—in experiment 11 weeks.
c Died Oct. 20,—in experiment 5 weeks.

TABLE IX. Individual weights and gains.—Concluded.

Capon number	Initial weight Lbs.	Final weight Lbs.	Average weekly gain Lbs.	Capon number	Initial weight Lbs.	Final weight Lbs.	Average weekly gain Lbs.
Lot 3				Lot 4			
51	2.05	4.35	.121	76	2.0	7.7	.300
52	1 75	6.9	.271	77	2.45	8.3	.308
53	2.4	7.1	.247	78	2.2	7.8	.295
54	2.2	6.6	.232	79	2.6	7.5	.258
55	3.85	9.0	.271	80	2.6	6.05	.182
56	3.8	7.5	.195	81	4.2	9.2	.263
57	3.	7.9	.258	82	3.9	8.2	.226
58	3.15	7.8	.245	83	3.65	9.2	.292
59	3 15	8.35	.274	84	2.2	7.2	.263
60	3.35	8.05	.247	85	3.4	6.0	.137
61	3.1	8.35	.276	86	2.1	9.0	.363
62	2.95	6.7	.197	87	3.1	6.85	.197
63	2.5	7.05	.239	88	3.3	8.4	.268
64	3.1	8.15	.266	89	3.65	8.9	.276
65	3.6	7.2	.189	90	2.8	8.0	.274
66	2.5	6.9	.232	91	3.8	8.9	.268
67	3.85	8.2	.229	92	3.7	9.0	.279
68	2.4	6.3	.205	93	3.1	7.05	.208
69	3.7	8.3	.242	94	3.6	8.85	.276
70	2.1	7.7	.295	95	4.3	7.4	.163
71	4.2	8.1	.205	96	2.15	2.7f	.153
72	4.55	9.85	.279	97	4.35	7.6	.171
73	4.0	9.2	.274	98	3.3	7.3	.211
74	3.1	6.1d	.181	99	4 8	8 3	.184
75	3.0	5.15e	.195	100	2.7	6.0	.174
Lot 5							
101	2.2	6.9	.247	114	3.35	7.75	.232
102	2.15	7.0	.255	115	2.2	4.75	.134
103	2.75	8.15	.284	116	3.7	7.85	.218
104	2.35	4.8	.129	117	3.9	6.4	.132
105	2.8	7.4	.242	118	3.65	8.4	.250
106	2 7	4.4	.089	119	4.0	9.8	.305
107	2.75	1.9g	....	120	4.8	7.5	.142
108	3.5	8.45	.261	121	4.25	11.4	.376
109	3 55	2.6h	....	122	3.85	7.3	.182
110	3.85	8.1	.224	123	2.2	4.25	.108
111	3.6	7.75	.218	124	3.6	7.4	.200
112	3.3	7.7	.232	125	2.75	2.45i	....
113	4.65	8.7	.213				

d Died Jan. 9,—in experiment 16 weeks, 4 days.
e Died Dec. 2,—in experiment 11 weeks.
f Died Oct. 11,—in experiment 3 weeks, 4 days.
g Died Sept. 26,—in experiment 1 week, 4 days.
h Died Nov. 5,—in experiment 7 weeks, 2 days.
i Died Oct. 23,—in experiment 5 weeks, 3 days.

Quarters: Lots 1, 2, 3 and 4 were each housed in half of a colony house 10x12 feet in size. They were allowed access to a heavily sodded plot of grass, one-sixth of an acre in size, until December 8, after which they were confined to the houses. Lot 5 was confined to a pen 7x9 feet in size in the brooder house (see frontispiece) with no outside run.

Rations: Lots 1, 2, 3 and 4 were fed the same rations as were received by lots of the same number in Experiment I. (See p. 157.)

Lot 5 was fed the same rations as Lot 1, but was confined to the house as noted above. In addition to the grain rations, each lot had access to grit; but no charcoal was fed in Experiment II.

Mortality: Nine birds died during this experiment—1 from Lot 1, 2 from Lot 2, 2 from Lot 3, 1 from Lot 4, and 3 from Lot 5.

Weights and gains: The capons, 125 in number, were divided into five uniform lots Sept. 14 on basis of individual weights taken Sept. 11. The initial weight was taken on Sept. 15,when the experiment began. The birds were weighed individually at the beginning, each fourth week thereafter, and at the close of the experiment. Each week between individual weights, each lot was weighed as a whole. Because of the fact that all these weights and gains, if given here, would be very cumbersome, only the initial and final weights, and average weekly gain during the entire experiment are included with these data. These figures are given in Table IX.

Table X shows the range of variation in rate of average weekly gain per capon. Only the gains of capons that were living at the close of the experiment are included.

TABLE X. Variation in average weekly gain per capon.

LOT	AVERAGE WEEKLY GAIN				
	LESS THAN .150 LBS.	.151–.200	.201–.250	.251–.300	MORE THAN .300 LB.
1		III	𝍸 𝍸 II	𝍸 I	III
2		𝍸	𝍸 II	𝍸 IIII	II
3	I	III	𝍸 𝍸	𝍸 IIII	
4	I	𝍸 I	III	𝍸 𝍸 II	II
5	𝍸 I	II	𝍸 IIII	III	II

In Table XI are given the average weight per bird each time they were weighed individually and the average gain per bird for each period. It should be noted that the last period contains only three, instead of four, weeks.

In this experiment, as in Experiment I, there was a greatly reduced rate of gain during the last period. This emphasizes the importance of very carefully watching the birds so that they may be marketed when they have reached market maturity, rather than kept for a longer period, after they cease to make profitable gains.

The feeder will be well paid for time required to weigh the capons every three or four weeks, especially during the latter part of the feeding period.

TABLE XI. Average weight and gain per bird for each period.

Period ending	Lot 1		Lot 2		Lot 3		Lot 4		Lot 5	
	Wt. per bird	Gain per bird	Wt. per bird	Gain per bird	Wt. per bird	Gain per bird	Wt. per bird	Gain per bird	Wt. per bird	Gain per bird
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Av. initial weight.	3.21	.....	3.22	.....	3.09	.....	3.20	.....	3.30	.....
Oct. 12.	4.27	1.058	4.43	1.206	4.51	1.418	4.50	1.234	3.97	.609
Nov. 9	5.01	.744	5.80	1.254	5.50	.986	5.94	1.438	5.20	1.038
Dec. 7.	6.70	1.699	7.04	1.069	6.63	1.081	6.87	.933	6.21	1.016
Jan. 4.....	7.64	.942	7.80	.759	7.44	.813	7.67	.800	7.02	.805
Jan. 25.....	7.84	.206	7.98	.178	7.63	.132	7.86	.192	7.37	.352
Av. total gain.....	.. .	4.645	...	4.509	.. .	4.475	....	4.606	....	3.811
Av. weekly gain..	....	.244	....	.237	....	.236	.. .	.242	....	.201

Feed consumed: A summary of the total feed consumed, feed consumed per pound of gain, and cost of feed per pound of gain, for each lot, is given in Table XII. The reader is again advised to apply prices in effect in his immediate locality to the amount of feed required per pound of gain as shown in Table XII, to determine the feed cost of a pound of gain for his local conditions, rather than to use the figures given in the last column of this table. The cost of feed given in this table simply serves to show the relative cost of producing a pound of gain with the different combinations of feeds, rather than the actual cost of feed per pound of gain.

TABLE XII. Total feed consumed and feed consumed per pound of gain.

Lot	Average number in lot	Feed consumed			Feed consumed per pound gain			Cost of feed per pound of gain*
		Grain	Mash	Grit	Grain	Mash	Total	
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Cents
1	24.44	621.7	298.7	14.15	5.48	2.63	8.11	10.11
2	23.84	609.25	316.15	14.4	5.67	2.94	8.61	10.27
3	24.46	663.	346.7	43.4	6.06	3.17	9.23	13.19
4	24.20	606.3	303.	13.75	5.44	2.72	8.16	9.79
5	22.75	542.8	280.6	35.05	6.26	3.24	9.50	11.88

*See page 162 for prices of feeds used in calculations. Pasture for Lots 1, 2, 3, and 4 was charged at the rate of $1.50 per acre or 25c for each lot. As the experiment began Sept. 15, this charge is perhaps abundantly high. In practice the droppings deposited on land will probably more than pay for the grass the capons consume.

Even a casual glance at Table XII, and at Table VI, giving the same information for Experiment I, will show that the ration given to Lot 3, while being, at usual market prices for feeds, considerably higher in cost than those fed to Lots 1, 2 and 4, is also less efficient.

In Experiment I, 11.6 percent more feed per pound of gain was required by Lot 3, than by Lots 1, 2 and 4. In Experiment II, this difference was 11.3 percent. The cost per unit of gain on basis of prices given on page 162 was 29.3 percent higher in Experiment I and 31.2 percent higher in Experiment II, with Lot 3 than with an average of Lots 1, 2 and 4.

In Table XIII is shown the average feed consumption per bird for each period.

TABLE XIII. Average feed consumed per bird.

Period ending	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Oct. 12	5.15	6.46	7.10	6.18	6.10
Nov. 9	5.93	8.08	8.49	8.12	7.77
Dec. 7	10.8	8.86	9.83	8.48	8.18
Jan. 4	9.74	9.87	9.78	9.21	8.52
Jan. 25*	6.23	5.68	6.12	5.66	5.78
Average per capon for experiment	37.67	38.81	41.28	37.58	36.19

*Three week period.

The last period in Table XIII covers only 3, instead of 4 weeks. If the capons had consumed feed at the same rate for four weeks, the figures would have been 8.31, 7.57, 8.14, 7.55 and 7.73 pounds for Lots 1, 2, 3, 4 and 5, respectively, and these figures rather than the ones given in the table are comparable with the figures showing feed consumed during the other periods.

The amount of feed consumed per pound of gain for each period and for the entire experiment is given in Table XIV. The feed requirement per unit of gain gradually increased as the experiment progressed. The gains during the last period were made at a loss rather than at a profit. In order to produce a maximum profit, the feeder should watch carefully the feed consumed and gains made by the capons so that he may dispose of them as soon as gains are no longer made at a profit.

TABLE XIV. Feed consumed per pound of gain.

Period ending	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Oct. 12	4.87	5.36	5.01	5.01	10.02
Nov. 9	7.98	6.44	8.61	5.65	7.49
Dec. 7	6.36	8.29	9.09	9.09	8.05
Jan. 4	10.34	13.01	12.04	11.52	10.59
Jan. 25	30.22	31.85	46.39	29.53	16.40
For experiment	8.11	8.61	9.23	8.16	9.50

Killing and marketing: On the evening of January 25, all feed and litter were removed from the pens in which the capons were confined. Early in the morning of January 26 the final weights were secured. The birds were then given only water during the day of January 26. On January 27 they were killed, after having fasted from 40 to 46 hours. The purpose of fasting the capons for this length of time before killing was to allow the digestive tract to become as nearly empty as possible. Giving an abundance of water for the first part of the fasting period doubtless aided in this cleansing process.

The final weight, weight before killing, weight after killing, loss in killing and percentage loss are shown in Table XV.

TABLE XV. Average shrinkage in killing.

Lot	Number	Average weight Jan. 26	Average weight before killing	Average weight after killing	Average loss in killing	Percentage loss based on weight before killing
		Lbs.	Lbs.	Lbs.	Lbs.	Percent
1	24	7.84	7.73	7 22	.508	6.58
2	23	7.98	7.82	7.27	.546	6.98
3	23	7.63	7.49	6.93	.561	7.49
4	24	7.86	7.70	7.18	.521	6.77
5	22	7.37	7.29	6.81	.477	6.55
All lots	116	7.74	7.61	7.09	.523	6.87

The capons were killed by cutting the veins—through the mouth—just back of the head, then sticking the knife through the cleft in the roof of the mouth to the brain. (This method of killing is described and illustrated in Circular 61 of the Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.) The capons were dry picked. As is customary in picking capons, the feathers were left on the neck about 3 inches back from the head, on the legs about 2 inches above the knee joints, on the two outer joints of the wings, on the tail and on the back around the base of the tail.

After the birds were killed on January 27, they were laid on boards in the incubator cellar to cool. The temperature was low enough thoroughly to cool the birds without freezing them, during the first night. After this the windows were opened and the birds were well frozen. They were packed in boxes on Jan. 30. Method of packing is shown in Fig. 1. The box was lined with water proof paper. The first layer of six birds was placed with breasts down and heads and feet up as shown at the left in Fig. 1. A thickness of

paper was placed between the two layers. The birds in the upper layer were placed with heads and feet down and breasts up. (See Fig. 1, right.) Paper was also placed on top before the lid was nailed down.

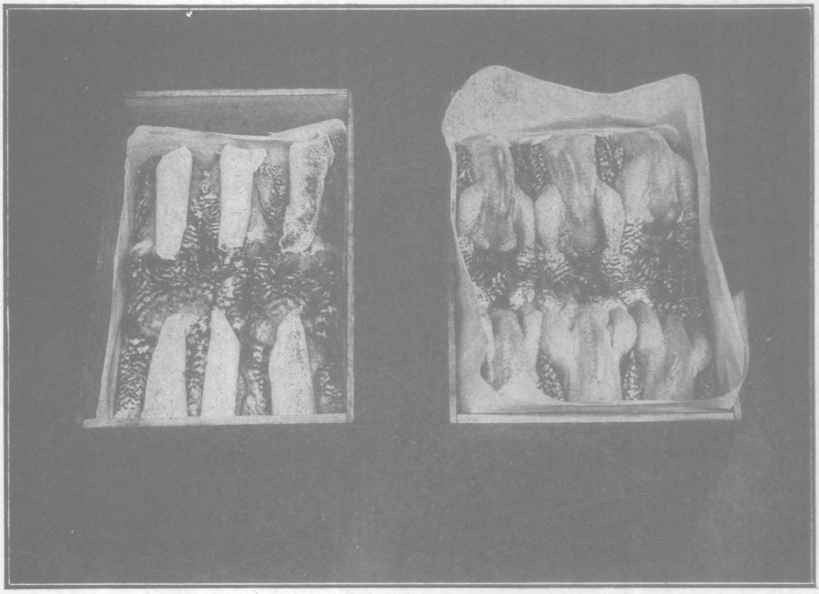

Fig. 1. Showing method of packing capons in boxes.

Nine boxes, containing 108 capons, were shipped by refrigerator freight from Wooster, February 2. They were consigned to a commission merchant in New York City. Eight of the smallest capons were sold locally. Below is given a statement of the sale of these capons.

Number	Av. weight		
12—107 pounds capons,	8.9 pounds, at 26c		$27.82
24—187 pounds capons,	7.8 pounds, at 25c		46.75
36—253 pounds capons,	7.0 pounds, at 24c		60.72
24—143 pounds capons,	6.0 pounds, at 23c		32.89
12— 86 pounds slips	at 20c		17.20
8— 38 pounds capons	at 17c		6.40
			$191.84
Freight		$5.46	
Cartage		.90	
Commission		9.27	$ 15.63
Net returns			$176.21

It will be noted that the heaviest capons sold at the highest price per pound, and the lightest at the lowest price per pound, excepting slips. (A slip is the result of an unsuccessful operation, more nearly resembling the cockerel, both in appearance and in quality of flesh, than does the capon.) This plainly shows the advisability of growing the capons to as large a size as possible, at a reasonable feed cost per pound of gain, before they are marketed.

It is not possible to give a definite statement regarding the financial profit that will result from capon feeding operations. Much depends upon the skill of the feeder in producing maximum gains at the lowest cost. Cost of feeds and labor, the value of cockerels at 2½ to 3 pounds weight and the market price for capons influence the profit to a great extent. The labor cost and cost of equipment may be very low, because the capons require very little attention, and any kind of a shelter that will keep them dry and prevent draughts will be found satisfactory for housing them. They can be rather closely crowded in pens without apparently causing any bad results, especially if they have sufficient range outside the house. In this experiment, 22 to 24 capons were housed in a pen 5x6 feet in size.

Assuming that the cockerels were worth 15c per pound at the beginning of the experiment, and charging feed consumed at prices given on page 162, the sum of these two items is $118.87. This leaves $57.34 to pay for labor, overhead charges and packages for shipping the birds to market. With a reasonable investment in equipment, on which to charge interest and depreciation, and a reasonable charge for labor, this should leave a very fair margin of profit. In this experiment the cost of production would have been considerably decreased and consequently the margin of profit materially increased, had all lots been accorded the same treatment as Lot 1 or Lot 4.

SUMMARY

A summary of results secured in each experiment and an average of the two experiments on a percentage basis, using Lot 1 as a standard for comparison, is given in Table XVI.

In an average of both experiments the ration given to Lot 1 produced a slightly higher rate of gain than did those given Lots 2, 3 and 4.

TABLE XVI.

Lot	Rate of gain			Average feed consumed per bird			Feed consumed per pound gain			Cost of feed consumed per pound gain*		
	I	II	Av.	I	II	Av.	I	II	Av.	I	II	Av.
1	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
2	99.	97.1	98.2	104.3	103.	104.8	105.3	106.1	105.1	95.4	101.6	97.
3	102.	96.7	99.5	118.	109.6	115.4	115.4	113.8	114.5	128.3	130.5	128.7
4	91.6	99.2	94.5	96.4	99.8	98.1	104.8	100.6	103.2	100.1	96.8	98.8
5	.....	82.4	.....	.....	96.1	.....	.....	117.1	.....	.....	117.5	.....

*See page 162 for prices of feeds, as used in calculations.

Lot 2, receiving a ration which contained a constantly decreasing amount of protein, made a lower rate of gain at a higher feed consumption per pound of gain in both experiments, than did Lot 1, fed a ration which carried the same proportion of protein throughout the experiments. The cost of feed per unit of gain was somewhat lower with Lot 2 than with Lot 1 in Experiment I, and slightly higher in Experiment II.

Lot 3 consumed most feed per bird, and per pound of gain. Cost of feed per pound of gain was 30.5 percent higher with Lot 3 than with Lots 1, 2 and 4.

In Experiment II, capons confined to small pens from the beginning of the experiment, while consuming only 2 percent less feed per bird, gained almost 17 percent less per bird than did capons allowed range for the first 12 weeks of the experiment. Cost of feed per unit of gain was 17.5 percent higher with the capons in confinement than with those on range.

In Experiment I, oilmeal did not prove to be a satisfactory supplement for corn. Lot 5, given a ration of corn and oilmeal for 12 weeks, gained less than one-fifth as much as did Lot 1. After changing the ration to that given Lot 1, the capons made very satisfactory gains.

NOTICE

The following publications of this Station have not been sent to the entire mailing list, because of the technical character of some of them and of the limited areas in which others are likely to be found interesting. Any of these publications, however, will be sent free to any address on application. Address, EXPERIMENT STATION, Wooster, Ohio.

BULLETINS PUBLISHED IN LESS THAN FULL EDITION

Bulletin 234—Flour Mill Fumigation, by W. H. Goodwin, January, 1912.

Bulletin 238—Tobacco Culture in Ohio, by A. D. Selby and True Houser, March, 1912.

Bulletin 239—Tobacco: Breeding Cigar Filler in Ohio, by A. D. Selby and True Houser, April, 1912.

Bulletin 244—Sweet Clover, by W. A. Lloyd, June, 1912.

Bulletin 247—Nitrogen and Mineral Constituents of the Alfalfa Plant, by J. W. Ames and Geo. E. Boltz, June, 1912.

Bulletin 255—Mineral and Organic Analyses of Foods, by E. B. Forbes, January, 1913.

Bulletin 256—The Miami County Experiment Farm; Second Annual Report, for 1912, February, 1913.

Bulletin 258—The Paulding County Experiment Farm; Second Annual Report, for 1912, February, 1913.

Bulletin 261—Soil Investigations, by J. W. Ames and E. W. Gaither, June, 1913.

Bulletin 271—A Chemical Study of the Nutrition of Swine, by E. B. Forbes, February, 1914.

Bulletin 272—The Hamilton County Experiment Farm; Second Annual Report, for 1913, May, 1914.

Bulletin 273—The Paulding County Experiment Farm; Third Annual Report, for 1913, May, 1914.

Bulletin 274—The Miami County Experiment Farm; Third Annual Report, for 1913, June, 1914.

Bulletin 275—The Clermont County Experiment Farm; Second Annual Report, for 1913, June, 1914.

Bulletin 5, Technical Series— Phosphorus Compounds in Animal Metabolism, by E. B. Forbes and M. Helen Keith, March, 1914.

Circular 124—Horticultural Information, May, 1912.